FURTHER NOTES ON THE APHIDIDAE COLLECTED IN THE VICINITY OF STANFORD UNIVERSITY

By W. M. Davidson

In the Journal of Economic Entomology (Vol. II. No. 4, August, 1909), I listed the Aphididæ studied during a year's observation in this region. During the year just passed I have continued my studies on this family and am now able to increase considerably the number of species tabulated in my former report. Mr. J. J. Davis (Annals of the Ent. Soc. of America, Vol. I, 4 and II, 1) has lately reported *Callipterus* (*Pterocallis*)*tiliæ*, an European insect, from America, thus corroborating my inclusion of this species in my former paper. I include a list of Aphididæ so far reported from California. This paper was prepared in the Entomological laboratories at Stanford University.

Phylloxera vastatrix Planchon. This species was formerly abundant in California but of late years its numbers have diminished very considerably. On *Vitis*.

Chermes pinicorticis Fitch. This insect is often very destructive to young trees, sometimes killing them. On *Pinus maritima*.

Chermes coweni Gillette. I have taken this species on a young Douglass spruce at Palo Alto. On April 13 of this year I noticed a swarm of Lampyrid beetles (kindly determined for me by Mr. W. M. Mann as *Podabrus tomentosus* Say) flying around the aphids and at times settling among them. Several times during the following week I observed this same procedure, although in the morning the beetles were always quietly feeding on the lice while in the evenings they were very active and did not remain settled for more than a few moments at a time. I counted one evening forty of the Lampyrids at work. When disturbed they drop to the ground but recover themselves just before striking it and fly off. I have noticed a few of the fire-flies attacking *Lachnus occidentalis* and *Macrosiphum rosæ*, but never in large numbers.

Pemphigus betæ Doane. On the roots of dock (*Rumex occidentalis*) and of other related plants.

Pemphigus populitransversus Riley. This species was wrongly called *P. populicaulis* in my former paper. Found in large numbers on *Populus trichocarpa*.

Pemphigus ranunculi sp. nov. Alate female (mounted in balsam). Head, meso- and meta-thorax black. Prothorax olive. Antennæ

widely distant, dusky, with the basal half of the joints paler. Third joint with 25, fourth with 8, fifth with 6, sixth with about 3 transverse sensoria. Unguis of sixth joint about one seventh as long as rest of joint. Eyes black, ocular tubercles prominent. Prothorax without lateral tubercles. Meso-thorax with four small pale spots arranged in a transverse row. Legs dusky. Abdomen green, with four rows of darker disk-like spots on the dorsum. These are apparently glands for the excretion of the flocculent material which this insect exudes. Body broadest at the fourth segment. Cornicles absent. Last abdominal segment drawn out and blunted. Wing large; stigma short, green. Insertions and veins greenish. Sub-costa duskier. Third discoidal absent at the base. Hind wings with two discoidals arising a very short distance apart. Lower side of thorax black. Beak pale, slender, reaches second coxæ.

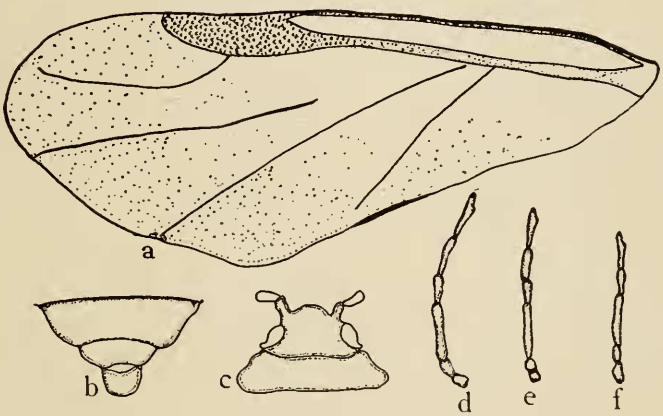

Fig. 28. *Pemphigus ranunculi.* Alate female; *a*, wing; *b*, tip of abdomen; *c*, head and prothorax; *d*, antenna; *e*, antenna of wingless female; *f*, antenna of young (original).

Pupa. Entirely green except wing-cases, antennæ, legs, and tip of last abdominal segment, which parts are slightly dusky. Eyes black. Antennæ as in the winged form.

Apterous viviparous female. Green. Shields on head, antennæ, legs, tip of abdomen and beak dusky. Antennæ barely one third the length of body. There are four rows of circular dusky areas on the dorsum of the abdomen as in the alate insect. Compound eyes very small, lateral, black. Taken in March on the stalks of the buttercup (*Ranunculus californicus*) where it congregates in great numbers. The insects cover their whole body except the head with a bluish flocculent material.

MEASUREMENTS

	Alate female	Apterous viviparæ
Length body,	3.1 mm.	3.2 mm.
Breadth body,	1.25 mm.	1.35 mm.
Wing expanse,	8.6 mm.	
Antennæ I,	.12 mm.	.09 mm.
II,	.15 mm.	.11 mm.
III,	.45 mm.	.30 mm.
IV,	.18 mm.	.07 mm.
V,	.21 mm.	.12 mm.
VI,	.22 mm.	.16 mm.

Pemphigus populiconduplifolius Cowen. Making galls on the poplar (*Populus trichocarpa*) in April. The stem mother is olive green, with darker longitudinal stripes. The eyes are small and black. The terminal portion of the abdomen is rather bristly. Cauda and cornicles absent. Beak just reaches second coxæ. The head is black, the antennæ hyaline, and the legs dusky. I doubt if the specimens examined were full grown so do not give any measurements.

Pemphigus populimonilis Riley. Abundant in Tulare County on *Populus fremonti* during the summer months at least.

Schizoneura lanigera Haus. On cultivated apple.

Schizoneura querci Fitch. Found in considerable abundance on the live-oak (*Q. agrifolia*).

Schizoneura americana Riley. Several years ago this insect was so abundant on the elms on the Stanford University campus as to almost kill the trees. At the present time it is not at all common.

Lachnus viminalis Fonsc. On *Salix* sp. Much parasitized by an *Ephedrus*.

Lachnus abietis Fitch. This large aphis is at times extremely common and at other times it appears to be almost totally exterminated by Syrphid larvæ. I have never found any winged forms although my observations on colonies of the Lachnus have extended over eighteen months. On *Abies concolor*.

Lachnus pini-radiatæ Davidson. On the needles and twigs of *Pinus radiata*.

Lachnus occidentalis Davidson. Abundant on the smaller branches and twigs of the spruce (*Abies grandis*) secreting a woolly material which causes the twigs to assume a bluish color. Although I have had colonies under observation for two years I have never seen the winged form. The Syrphid flies *Syrphus arcuatus* and *S. opinator* exact a very large toll from this aphid and are themselves frequently parasitized by a large Braconid.

Lachnus alnifoliæ Fitch. On the under side of the leaves of *Alnus rhombifolia.*

Cladobius saliciti Harris. The eggs of this species are deposited in large quantities on the twigs of willow or poplar in November These hatch before the end of January, the newly-hatched larvæ assembling in masses at certain places to feed on the twigs. The leaves of the tree do not develop for two weeks after the insect hatches. In the fall this insect increases with great rapidity notwithstanding the heavy toll exacted by an *Aphidius.*

Cladobius rufulus Davidson. On *Populus* and *Salix.*

Chaitophorus viminalis Monell. I have taken this species in both sexes in the fall and as late as late November. It feeds on various species of willow.

Chaitophorus populifoliæ Fitch. The colonies of this species have the largest numbers of individuals just before the leaves of their food-plant begin to fall. At this time there are two types of apterous viviparous females, both green, but one paler than the other. The paler variety gives birth to the small red males, while the darker form begets females winged and wingless. The males are winged and are of a claret color, quite a little smaller than the alate females, which latter are green. Males begin to emerge fully winged from the 25th of October on. At this time males and females were about equal in numbers and remain so until the leaves drop, when all disappear.

The alate male. Length, 1.85 mm. Breadth, .85 mm. Wing expansion, 5. mm. Antennal joints—III, .45 mm.; IV, .28 mm.; V, .22 mm.; VI, .08 mm.; VII, .4 mm. Antenna yellow, last three joints red. Sensoria on all joints except I, II and VII. Eyes bright red. Head, prothorax, thoracic lobes dusky red. Pale part of the prothorax flesh-colored. Legs yellow, hind femora reddish. Abdomen brick-red, with a darker transverse dorsal bar on each segment attaining the margin on the two caudal segments. Cornicles yellowish-red, expanded at the base, slightly longer than broad at their bases. Tail small, globular, gray. Caudal appendage pale, drawn out. Wings large, third discoidal obsolete at base. Insertions of wing yellowish. Stigma gray. Veins reddish-brown.

Comparative Measurements of the Alate Male and Female

	Male	Female
Length body,	1.45 mm.	2.2 mm.
Breadth body,	.65 mm.	1.05 mm.
Antennæ,	1.30 mm.	1.25 mm.
Cornicles,	.075 mm.	.08 mm.
Expanse wings,	5.2 mm.	6.15 mm.

Chaitophorus nigræ Oestl. (?). I took a small black Chaitophorus

which has certain affinities with this species and may be the same. Only apterous forms were seen. On *Salix*.

Chaitophorus negundinis Thos. I took this insect in considerable abundance on the under side of leaves of *Acer negundo* in April. Both alate and apterous forms were present, but I could not find any males so early in the year. On the day on which I first noticed the aphid there were a few large yellow wingless forms which were presumably stem mothers left over. Towards the end of this month I took a number of the pale leafy dimorphs.

Phyllaphis fagi Linn. One specimen, an apterous female, taken on the under side of a copper beach at Palo Alto in April.

Idiopterus nephrelepidis Davis. On greenhouse ferns. Probably imported from the tropics on ferns. The insect was collected here some years ago but is not to be found at the present time.

Callipterus castaneæ Buck. On chestnut (*Castanea*).

Callipterus betulæcolens Fitch. On *Betula* sp.

Callipterus caryæ Monell. On cultivated walnut.

Callipterus arundicolens Clarke. On bamboo (*Arundo*).

Callipterus ulmifolii Monell. On *Ulmus americana*.

Callipterus tiliæ Linn. On *Tilia americana*. The stem mothers in spring are very pale and immaculate.

Callipterus quercus Kalt. I am sceptical as to the identity of this Callipterus found at Palo Alto on both the blue oak (*Quercus douglasii*) and on the white oak (*Quercus lobata*). It seems very near Kaltenbach's species, having the three pairs of tubercles on the dorsum and otherwise resembling it. I cannot satisfactorily compare it to any described American species. There are several English oaks near the trees infested and on one of these I found a very pale *Callipterus*, apparently *C. quercus*. Thus it is possible that the insect came on the young oaks when they were imported. However, I found this same species on the black oak (*Q. californica*) on the hills around San José where I found no English oaks although some doubtless existed in the valley towns below.

Aphis albipes Oestl. Found in April on the tender stalks and in curled leaves of the snowberry (*Symphoricarpus racemosus*). A striking insect much preyed upon by Syrphus flies.

Aphis brassicæ Linn. Common everywhere but checked, successfully at least in Santa Clara County, by its parasite *Diæretus californicus* Baker. On cruciferous plants.

Aphis rumicis Linn. Taken on the terminal shoots of ivy. An extensively parasitized species.

Aphis medicaginis Koch. On *Medicago denticulata*.

Aphis ceanothi Clarke. On tips of twigs of *Ceanothus cuneatus.*

Aphis lutescens Monell. Taken in great quantities on milkweed (*Asclepias mexicana*).

Aphis crataegifoliæ Fitch. Found in the fall in large numbers on the leaves of *Crataegus oxycantha* planted along the sidewalks in the towns of San José and Palo Alto. I could not find any alate forms but procured a large number of the black, oval, shining ova whence hatched the first spring brood of larvæ. I kept the twigs in water and noticed the first larva emerge on the 7th of February just as the buds were swelling. A week later a dozen larvæ had hatched. The young are paler than the adults and feed on the opening buds. Alate forms appeared in April.

Aphis nerii Kalt. This insect was taken in Sonoma County on oleander.

Aphis bakeri Cowen (?). A doubtful species on *Senecio vulgaris.*

Aphis mali Fabr (?). A species very similar to *A. mali* on the terminal leaves of *Laurus laurustinus,* causing them to curl.

Hyalopterus arundinis Fabr. On the plum in great quantities in May.

Siphocoryne avenæ Fabr. Sparingly attacking wheat and oats.

Siphocoryne salicis Monell. This is not a common insect but it sometimes occurs in large numbers on single trees.

Siphocoryne xylostei Schrank. Taken in abundance on the terminal leaves of the cultivated honeysuckle (*Lonicera* sp.) where it curls the foliage and renders the plant very unsightly. Syrphid larvæ prey extensively on it.

Siphocoryne foeniculi Pass. Taken in November on fennel (*Foeniculum vulgare*). Quite generally parasited by a Braconid.

Siphocoryne conii Davidson. Throughout the year feeding on *Conium maculatum.* It prefers the flowers and seeds to the leaves. Parasitized by an *Aphidius.*

Drephanosiphum platanoides Schr. This most interesting insect occurs in the summer and fall upon the European sycamore (*Platanus orientalis*). I have not been able to locate the eggs during winter, notwithstanding the fact that oviparous females were very common in November. The oviparous female is peculiar in having its ovipositor protruding considerably.

Rhopalosiphum tulipæ Thos. On leaves of tulip (*Tulipa*).

Rhopalosiphum nymphaeæ Linn. Common on *Polygonum* sp.

Rhopalosiphum violæ Pergande. A beautiful insect which occurs on leaves of cultivated violet, generally on the under side.

Rhopalosiphum lactucæ Kalt. At first I thought this insect was

R. dianthi but closer examination showed it to be *R. lactucæ,* an European form lately reported from America, (Canadian Entomologist, Vol. XXXIII, No. 3, 1901. E. D. Sanderson). Taken sparingly on *Sonchus oleracea.*

Rhopalosiphum berberidis Kalt. I took the oval, black eggs in January on the stalks of barberry (*Berberis vulgaris*). At this time oviparous females were still producing eggs. Eggs hatched from January 20 on, producing almost entirely apterous forms. By April winged and wingless viviparæ were abundant on the under side of the leaves.

Rhopalosiphum dianthi Schrank. This species is abundant on several plants in Santa Clara County. Among its hosts are Groundsel (*Senecio vulgare*), *Sonchus oleracea* and *S. asper,* celestial pepper, forget-me-not (*Cyanoglossum*), and *Amsinkia.* I have bred several parasites from *R. dianthi,* among these a minute wingless dipterous insect.

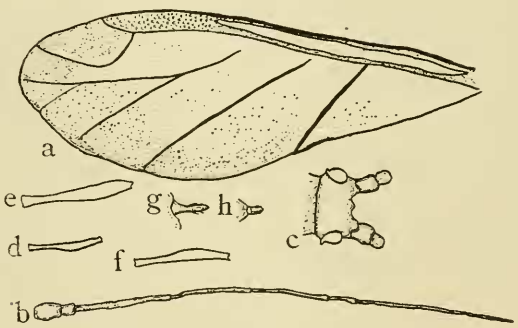

Fig. 29. *Rhopalosiphum arbuti.* Alate female; *a,* wing; *b,* antenna; *c,* head; *e,* cornicle; *g,* cauda; *d,* cornicle of young; *f,* cornicle, and *h,* cauda of apterous female (original).

Rhopalosiphum arbuti sp. nov. Alate male. Length of body, 1.8 mm. Breadth of body, .48 mm. Wing expanse, 6.1 mm. Cornicles, .50 mm. Antennæ—III, 52 mm.; IV, .40 mm.; V, .35 mm.; VI, .12 mm.; VII, 1.05 mm. General color reddish-yellow, newly emerged individuals pale green throughout. Antennæ on small frontal tubercles, half as long again as the body, dusky except joints I and II and base of III. Seventh joint much the longest, exceeding third and fourth together, very fine. Joints III and IV with numerous small sensoria. Eyes red. Head, prothorax, thoracic lobes, scutellum pale brown. Pale part of prothorax and abdomen yellowish-brown, latter with several undefined dusky bars on the dorsum and with dusky lateral spots and blotches. Abdomen broadest just anterior to the

cornicles. Cornicles long, slender, contracted at base for half their length, clavate, dusky brown, five times the metatarsi in length, extending half their length beyond the tip of the abdomen. Style golden yellow, tapering, about as long as the tarsi, pilose. Legs long, slender, very dusky except for anterior two-thirds of the femora and the coxæ, which are pale yellow. Beak just exceeds third coxæ. Wings hyaline, large. Insertions and sub-costa pale greenish yellow. Stigma short, gray. Veins dark brown, first two discoidals robust, third discoidal obsolete at base. Stigmatic vein curved regularly. Second branch of cubitus slightly shorter than the part between the forks.

Pupa. Pale green. Antennæ half again as long as body, green with black tips to the joints. Eyes crimson. Style conical. Abdomen with reddish areas on the sides. Size 1.3 x .55 mm.

Apterous viviparous female. Pale yellowish-green. Head in the mature insect with reddish tinge, small. Antennæ slightly longer than the body, situated on evident tubercles, pale except articulations and last two joints, which are dusky. Seventh joint almost as long as joints III, IV, and V together. Eyes bright red. Abdomen very pale, oval. Cornicles slightly dusky, clavate, broadest just beyond the middle. Cauda pale, short, conical. Legs pale, concolorous with the body and cauda, tarsi and tibial apices dusky. Beak with a brown tip, reaches third coxæ. This species is common throughout the year on the under surface of the leaves of the Madrone (*Arbutus menziesii*). It is quite extensively preyed upon by Braconidæ.

Measurements of the apterous female: Length body, 1.55 mm.; breadth body, .68 mm.; cornicles, .45 mm.; antennæ III, .35 mm.; IV, .30 mm.; V, .30 mm.; VI, .10 mm.; VII, .80 mm.

Alate female: Length of body, 2.0 mm.; breadth of body, .9 mm.; expanse of wings, 6.85 mm.; cornicles, .5 mm.; cauda, .2 mm.; antennæ III, .5 mm.; IV, .45 mm.; V, .42 mm.; VI, .14 mm.; VII, 1.05 mm.

Alate female. Pale green, with some indefinite dusky markings on the abdomen. Head, prothorax, scutellum, and thoracic lobes brown. Eyes red. Antennæ brown, joints III, VI, VII, and distal half of IV and V dark olive green, on frontal tubercles. Joint III has about 20 small sensoria, joint IV about 8 smaller ones. Cornicles brown, clavate, broad at the base then narrowing for half their length and expanding distad, reaching their widest at apical fourth, then slightly narrowing to the apex. Cauda two-fifths the length of cornicles, slightly upturned, concolorous with the abdomen with the tip dusky. Legs long, light brown; tarsi, distal half of femora, proximal half of tibiæ dark brown. Wings large; stigma gray; veins dark brown, thick, the first discoidal with a smoky border, also the second, but the border less conspicuous. Beak pale, the tip black, reaching second coxæ.

Myzus rosarum Walk. Taken sparingly in the fall on wild rose (*Rosa californica*).

Myzus persicæ Sulz. In the spring on peach.

Myzus vincæ Gillette. On the youngest leaves of periwinkle (*Vinca major*).

Macrosiphum tulipæ Monell. On petals and leaves of *Tulipa*.

Macrosiphum rosæ Reaum. Very abundant on the young leaves and buds of cultivated rose. Both the red and green forms are common. I bred *Syrphus ribesii* from larvæ feeding on this Aphid.

Macrosiphum californicum Clarke. Found occasionally on the young twigs of willows (*Salix* sp.).

Macrosiphum pisi Kalt. Taken on *Vicia* sp., cultivated bean and *Urtica holoscrica*.

Macrosiphum sonchella Monell. On *Sonchus oleracea*. Not nearly so common on sow-thistle as *Rhopalosiphum dianthi*. Both insects are to be found together on the same plant.

Macrosiphum accrifolii Thos. This beautiful insect occurs on *Acer dasycarpum*.

Macrosiphum citrifolii Ashm. Taken at Lindsay, Tulare County, in the summer, where it is well held in check by its insect enemies, especially by internal parasites.

Macrosiphum orthocarpi Davidson. Found among the flowers of owl-clover (*Orthocarpus purpurascens*) in April.

A list of species reported from California which have not been taken by me

Schizoneura pinicola Thos.; on *Pinus radiata*, Berkeley.

Callipterus coryli Goetze; on hazlenut, Berkeley.

Aphis calendulicola Monell; on marigold, Berkeley.

Aphis gossypii Glover; on shepherd's purse, water-melon, Newcastle, Watsonville.

Aphis maidis Fitch; on sorghum and corn, Berkeley, Watsonville.

Aphis mori Clarke; on mulberry.

Aphis alamedensis Clarke; on greengage, Alameda County.

Aphis œnotheræ Oestl.; on *Oenothera bectiana* and *Epilobium*, Berkeley.

Aphis persicæ-nigæ Smith; on peach and plum, Placer County.

Aphis sorbi Kalt.; on apple, Placer County.

Phorodon scrophulariæ Thos.; on *Scrophularia* sp. Berkeley.

Phorodon humuli Schrank; on hops and prune in California.

Chaitophorus populicola Thos.; on *P. trichocarpa*, Santa Paula.

Lachnus californicus Essig; on pines, Claremont.

Pemphigus radicola Essig; on roots of *Amaranthus retroflexus* and *Solanum douglasii*. From the description of this species I am inclined to regard it as synonymous with *Pemphigus betæ* Doane.

Macrosiphum jasmini Clarke; on jasmine, Berkeley.

Macrosiphum lycopersici Clarke; on tomato, Berkeley.

Macrosiphum valerianiæ Clarke; on valerian, Berkeley.

Macrosiphum rhamni Clarke; on *Rhamnus californicus*, Lander.

Macrosiphum baccharidis Clarke; on *Baccharis* sp., Berkeley.

Bibliography of Aphididae

As Sanborn in his "Kansas Aphididæ" (University of Kansas Science Bulletin, Vol. III, No. 8) has so recently given a very com-

plete bibliography of the family, it is unnecessary to publish such a list here. The following works, however, may be cited as dealing particularly with western species:

A List of California Aphididæ, W. T. CLARKE. Can. Ent., Vol. 35.

Host-plant List of North American Aphididæ. T. A. WILLIAMS. Univ. Nebraska Special Bulletin No. 1. July, 1908.

Orchard Plant-lice and Their Remedies. C. P. GILLETTE and E. P. TAYLOR. Exp. Station of the Colo. Agr. Coll. Bull. 134. Sept., 1908.

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Aphididæ of Southern California. E. O. ESSIG. Pomona Journal of Entomology, Vol. 1, Nos. 1 & 4.

Notes on Aphididæ collected around Stanford Uinversity. W. M. DAVIDSON. Journal of Econ. Ent., August, 1909.

Scientific Notes

Elm leaf beetle (*Galerucella luteola* Mull.). This species was unusually abundant and destructive in the upper Hudson Valley, being very injurious from Poughkeepsie north to Cohoes, Stillwater and Greenwich. A record of serious injury, accompanied by numerous specimens, was also received from Mr. Frank T. Clark of Ticonderoga, N. Y. This is the northernmost record for serious injury by this beetle in the state of New York.

Snow-white linden moth (*Ennomos subsignarius* Hubn.). This insect has continued its depredations of the last two years in the Catskills, though the defoliated area is probably not so extensive as in 1909. There has been a marked falling off in the numbers of moths observed at lights in cities and village along the Hudson River, if one may accept as safe criteria, local newspaper notices supplemented by personal observation.

E. P. FELT